

The Analysis of Macroalgae Biomass found around Hawai'i for Bioethanol Production

Brandon A. Yoza and Stephen Masutani

University of Hawai'i
Hawai'i Natural Energy Institute

Watanabe 112

Wednesday, November 7
3:30 - 4:30 pm Seminar

Abstract

According to the Hawaii Invasive Species Organization, invasive algae cost the State of Hawaii in excess of \$20 million annually. The primary goal of our research is to provide information that could be used to support invasive marine algae control efforts through the recycling of unused biomass wastes collected during reef clean-ups by producing valuable products such as renewable fuels. A study initiated by HNEI to characterize different species of macroalgae found in the waters around Hawaii that have energy potential, specifically for the production of ethanol. Macroalgae commonly found in the ocean around Hawaii were collected from near shore locations and their potential as biomass feedstock for fermentative ethanol was investigated. A green algae, *Ulva reticulata*, was selected for further analysis. This species forms large complex structures that grow quickly and has high dry biomass percentage (20%), soluble carbohydrates (18%), and high total carbohydrates along with low quantities of lignin (13%). During acid saccharification, it was determined that 49% of the total mass was observed as sugars in the hydrolyzate, however fermentation was problematic. Enzymatic saccharification using cellulase from *Trichoderma reesei* was attempted which recovered a measured maximum of 20% glucose based on the initial dry mass. Fermentation successfully converted all the glucose to ethanol. The measured ethanol yield corresponded to approximately 90 liters per tonne of dried macroalgae.